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1. Introduction

1.1 Purpose

The purpose of the E-commerce system project is to develop a robust and user-friendly online platform that facilitates buying and selling of products and services. This system aims to fulfill the following objectives:

- Provide a seamless and convenient shopping experience for customers: Allow users to browse products, add items to their shopping cart, and complete purchases securely and efficiently.

- Offer a comprehensive and flexible platform for businesses: Enable businesses to manage their online presence, including product listings, inventory, orders, and customer accounts.

- Enhance sales and profitability: Facilitate online transactions, reach a wider audience, and ultimately improve business revenue.

- Increase operational efficiency and reduce costs: Automate manual processes, streamline workflows, and minimize operational overhead.

- Adapt to changing market trends and customer needs: Offer a scalable and adaptable platform that can evolve as the E-commerce landscape changes.

- Ensure data security and customer privacy: Implement robust security measures to protect sensitive data and maintain user trust.

1.2 Intended Audience and Reading Suggestions

This E-commerce system project document is intended for a diverse audience, including:

- Project stakeholders: Individuals with a vested interest in the project's success, such as executives, investors, and project sponsors.

- System developers: Individuals responsible for designing, developing, and implementing the E-commerce system.

- System administrators: Individuals responsible for managing and maintaining the E-commerce system after deployment.

- System users: Individuals who will interact with the E-commerce system on a regular basis, such as customers and business owners.

For all audiences:

- Start by reviewing the Introduction section (Section 1) to gain a general understanding of the project's purpose, goals, and scope.
- Proceed to the Overall Description section (Section 2) for a comprehensive overview of the system's functionalities and target users.

For Project stakeholders:

- Focus on sections like 1.4 Product Scope and 5. Other Nonfunctional Requirements to grasp the system's limitations and critical performance aspects.
- Refer to Appendix B: Analysis Models for insights into the system's design and potential challenges.

For System developers:

- Dive deeper into sections like 3. External Interface Requirements and 4. System Features for detailed technical specifications and implementation guidelines.
- Utilize the Glossary (Appendix A) for definitions of technical terms and acronyms.

For System users:

- Focus on sections like 3.1 User Interfaces and 4.1 System Feature 1 (and subsequent feature descriptions) to understand how to interact with the system and utilize its functionalities.
- Utilize the User Documentation (Section 2.6) for readily available information and guidance.

1.3 Product Scope

What the E-commerce System will include:

- Product Listing and Management: Businesses can create and manage product listings, including product details, images, pricing, inventory information, and product variations.
- Shopping Cart and Checkout: Customers can browse products, add items to their shopping cart, and proceed to a secure checkout process.

- Order Processing and Fulfillment: The system will automate order processing, including order confirmation, payment processing, and order fulfillment through integration with shipping providers.

- Customer Account Management: Customers can create and manage their accounts, track their orders, and access their purchase history.

- Payment Processing: Secure integration with various payment gateways to facilitate online transactions.

- Inventory Management: Real-time inventory tracking and management to ensure product availability and prevent overselling.

- Reporting and Analytics: Comprehensive reports and analytics tools to provide insights into sales performance, customer behavior, and overall system health.

2. Overall Description

2.1 Product Perspective

Overall Vision:

- To become the preferred E-commerce platform for both businesses and customers, enabling a thriving online ecosystem that fosters growth and innovation.

- To offer a comprehensive and scalable solution that adapts to changing market trends and evolving customer needs.

- To prioritize user experience, providing a user-centric design that facilitates intuitive navigation and efficient transactions.

- To ensure a secure and reliable platform, safeguarding sensitive information and building trust with users.

- To contribute to the economic growth and development of online businesses and communities.

2.2 Product Functions

The E-commerce system offers a comprehensive set of features and functionalities to cater to both businesses and customers.

For Businesses:

- Product Management:
  - Create and manage product listings with detailed descriptions, images, variations, and inventory tracking.
  - Set competitive prices and manage promotional offers, discounts, and coupons.
  - Categorize and organize products for easy browsing by customers.
- Order Management:
  - Process and fulfill orders efficiently with real-time inventory updates.
  - Manage shipping options and integrate with shipping providers.
  - Track order status and communicate with customers throughout the fulfillment process.
- Customer Management:
  - Manage customer accounts and track purchase history.
  - Create personalized offers and promotions based on customer preferences.
  - Offer efficient customer support through various channels.
- Reporting and Analytics:
  - Access comprehensive reports on sales performance, customer behavior, and website traffic.
  - Gain insights into product popularity, conversion rates, and marketing effectiveness.
  - Use data to make informed decisions and optimize business strategies.

For Customers:

- Product Search and Browsing:
  - Search for specific products using keywords, filters, and categories.
  - View detailed product information, including descriptions, images, reviews, and ratings.
  - Compare products and check product availability before making a purchase.
- Shopping Cart and Checkout:
  - Add desired products to the shopping cart and manage quantities.

- o Proceed to a secure checkout process with various payment options available.
- o Save shipping and billing information for faster future purchases.

- Order Tracking and Account Management:
  - o Track order status and delivery information in real-time.
  - o View order history and manage account details.
  - o Access customer support resources and contact information.

- Security and Privacy:
  - o Secure online transactions with encrypted data transmission and reliable payment gateways.
  - o Strong privacy measures to protect customer information and ensure compliance with data protection regulations.
  - o Control over personal information and preferences.

2.3 User Classes and Characteristics

1. Business Users:

- Shop Owners: Manage product listings, inventory, orders, and customer accounts.
- Inventory Managers: Responsible for maintaining accurate inventory levels and fulfilling orders.
- Marketers: Create and implement marketing campaigns to promote products and increase sales.
- Customer Service Representatives: Assist customers with inquiries, orders, and returns.

2. Customer Users:

- Registered Users: Create accounts for personalized shopping experiences and faster checkout.
- Guest Users: Purchase products without creating an account.
- New Customers: Exploring the platform and seeking specific products.
- Returning Customers: Familiar with the platform and potentially loyal to the brand.

3. System Administrators:

- Manage the overall system, including user permissions, security settings, and integrations.
- Monitor system performance and troubleshoot any technical issues.

2.4 Operating Environment

Hardware Requirements:

- CPU: Intel Core i5 or equivalent processor (recommended)
- RAM: 8GB RAM (minimum), 16GB RAM (recommended)
- Storage: 100GB SSD (minimum), 250GB SSD (recommended)
- Internet Connection: Broadband internet connection with minimum 5 Mbps download and upload speeds

Software Requirements:

- Operating System: Windows 10 or later, macOS 11 or later, Linux Ubuntu 20.04 or later
- Web Browser: Google Chrome, Mozilla Firefox, Safari, Microsoft Edge (latest versions)
- Database Software: MySQL 8.0 or later, PostgreSQL 14 or later
- Web Server: Apache 2.4 or later, Nginx 1.21 or later
- Programming Language: Python 3.8 or later (depending on chosen development platform)

2.5 Design and Implementation Constraints

- Project Scope: Initial limitations may exist regarding features, functionality, and supported platforms.
- Resource Availability: Project development may be constrained by available budget, time, and personnel.
- Technology Limitations: Chosen technologies may have limitations regarding scalability, performance, and security.

- Integration Challenges: Integrating with external services and systems may require additional effort and resources.

- Regulations and Compliance: Legal and regulatory requirements may influence system design and functionalities.

- User Adoption: Ensuring user acceptance and adoption of the system may require ongoing user support and training.

2.6 User Documentation

To ensure a smooth and efficient user experience, the E-commerce system will offer a comprehensive set of user documentation, including:

- User Manuals: Detailed guides explaining system functionalities, features, and user workflows for different user classes.

- Online Help Center: A searchable knowledge base with FAQs, troubleshooting tips, and step-by-step instructions.

- Video Tutorials: Visual demonstrations of key system features and functionalities.

- Context-sensitive Help: In-app pop-up guides and prompts for specific actions or functionalities.

- Contact Support: Access to customer service channels for personalized assistance and technical support.

2.7 Assumptions and Dependencies

The success of the E-commerce system relies on several key assumptions and external dependencies:

Assumptions:

- Market Acceptance: There is a sufficient market demand for the E-commerce platform and its target audience.

- User Adoption: Users will find the system user-friendly and adopt it readily.

- Technology Reliability: The chosen technologies will be reliable, secure, and scalable.

- Stable Internet Connectivity: Users will have consistent access to a stable internet connection.

- Third-party Services: External services and integrations (e.g., payment gateways, shipping providers) will function dependably.

Dependencies:

- Reliable Hosting Service: The E-commerce system requires a robust and secure hosting environment to handle website traffic and data storage.

- Payment Gateway Integration: Integration with a secure and reliable payment gateway is crucial for online transactions.

- Shipping Provider Integration: Efficient shipping services and reliable integration with chosen providers are essential for order fulfillment.

- Security Updates and Maintenance: Regular security updates and maintenance are necessary to address vulnerabilities and ensure system security.

- User Support and Training: Ongoing user support and training will be crucial for user adoption and satisfaction

3. External Interface Requirements

3.1 User Interfaces

The E-commerce system will offer intuitive and user-friendly interfaces for different user classes:

For Customers:

- Homepage: Clear navigation, product search bar, featured product categories, and prominent promotional banners.

- Product Pages: Detailed product information with images, descriptions, specifications, reviews, and ratings.

- Shopping Cart and Checkout: Simple and secure checkout process with various payment options.

- Account Management: User profile, order history, address book, wishlist, and communication preferences.

For Businesses:

- Product Management Dashboard: Add, edit, and manage product listings, inventory levels, and prices.

- Order Management Dashboard: View, process, and fulfill orders, manage shipping options, and track deliveries.

- Customer Management Dashboard: Access customer information, manage accounts, and provide customer support.

- Reporting and Analytics Dashboard: Analyze sales performance, customer behavior, and website traffic through comprehensive reports and visualizations.

General UI elements:

- Responsive design for optimal viewing experience on all devices (desktop, mobile, tablet).

- Consistent layout and branding across the platform.

- User-friendly navigation menus and search functions.

- Clear and concise instructions and error messages.

- Accessibility features for users with disabilities.

Expected User Interactions:

- Customers will browse products, search for specific items, add products to their cart, proceed to checkout, and complete purchases.

- Businesses will manage their product listings, inventory, orders, customers, and analyze data to improve their online business.

The UI design will prioritize usability and intuitive navigation to ensure a positive user experience for both customers and businesses.

3.2 Software Interfaces

The E-commerce system will integrate with various software components and APIs to provide a comprehensive and functional platform:

Internal APIs:

- Product Listing API: Enables creation, modification, and deletion of product listings.

- Inventory Management API: Tracks and updates inventory levels for accurate product availability.

- Order Processing API: Facilitates order creation, processing, and fulfillment.

- Customer Account API: Manages user accounts, profiles, and preferences.

- Reporting and Analytics API: Retrieves data for generating reports and insights.

External APIs:

- Payment Gateway API: Secure integration with chosen payment gateways for online transactions.

- Shipping Provider API: Connects with shipping companies for efficient order fulfillment.

- Marketing Automation API: Integrates with marketing automation tools for email campaigns and promotions.

- Social Media APIs: Enables social sharing and integration with social media platforms.

- Analytics Platforms API: Integrates with analytics platforms for advanced data analysis and reporting.

Additional Integrations:

- Third-party logistics platforms: For managing warehousing and shipping logistics.

- Customer service platforms: For providing seamless customer support through chatbots and ticketing systems.

- Website analytics tools: To track website traffic and user behavior.

3.3 Communications Interfaces

Communication Protocols:

- HTTP/HTTPS: For web-based communication between the platform and users' browsers.

- RESTful APIs: For programmatic access to system functionality and data exchange with external applications.

- SFTP/FTPS: For secure file transfer of product images, inventory data, and other critical information.

- WebSockets: For real-time communication and updates, such as order status notifications and chat functionalities.
- SMTP: For sending transactional emails, such as order confirmations and shipping notifications.

Data Formats:

- JSON: A lightweight and human-readable format for data exchange between applications.
- XML: A structured format for data exchange with legacy systems and third-party services.

4. System Features

As a user, I can exchange a product with a nearest user.

Success:

- You can exchange your old products with anyone in the site.
- You can sale your used product.

Failure:

- Showing the message-"No match found".
- No internet connection
- The page can't load

As a user, I want to know about the payment methods.

Success:

- You can pay by using credit card.
- You can pay by Bkash.
- You can pay cash on delivery.

Failure:

- Showing the message-"Enter valid mobile no or pin number"
- Card is declined
- There is no bkash account for this number or haven't sufficient balance
- No internet connection

- This page can't be load

As a user, I want a conditional refund of a product.

Success:

- You can get refunded if you want.
- In exchange of the product within several days, you can get conditional refunded.

Failure:

- Connection is lost
- Can't load this page. Please log in to get refund

As a user, I want to search product so that I can find my required product easily.

Success:

- You can search your product by category name.
- You can search your product by product name.
- You can search your product from your search history.

Failure:

- Please connect to the internet.
- Please login to search product.
- Get message-"No match is found".

As a user, I want to see recommended products so that I can choose best option easily.

Success:

- You can see your favorite product based on your selection for recommendation.
- You can get best suggestions for your product based on your order.
- You can get best suggestions based on your search.
- You can get best suggestion based on your wishlist.
- You get notification for recommended product.
- You can block any product recommendation.

Failure:

- Please connect to the internet.
- Please login for recommendation.
- You have to must select or search or order product or add product in whishlist for recommendation.

As a user, I want to see the description about products.

Success:

- You can see the best product description.

- You can see the ingredients and materials of that product. You will know the using procedure of that product.

- Video description will also be added.

- Authenticity will be shown.

Failure:

- Please connect to the internet.
- Please login to see product description.
- "Description is not available".

As a user, I want to see separately the old and new products.

Success:

- You can get old products.
- You can get new products.
- You can get an offer or a new price for your old products.
- Authenticity will be shown.

Failure:

- Please connect to the internet.
- Please login to see separately the old and new products.
- "Product is not available".

As a user, I want to get delivery report so that I can get delivery info.

Success:

- You can get conformation massage of order place.
- You can get required delivery time info.
- You can get latest status of order.
- You can get successful/ failure product delivery report.

Failure:

- Please connect to the internet.
- Please provide valid address.
- Please provide valid mobile number.

As a user, I want to see shipping system so that I can choose best option.

Success:

- You can see several shipping options.
- You can get shipping procedure info.
- You can get required shipping time info.

Failure:

- Please connect to the internet.
- Please select an item to deliver.
- Please provide valid address.
- Get message-"No match is found".

As a user, I want to see the ongoing offers easily so that I will be benefited.

Success:

- You can check the ongoing offer.
- You can recommend any offer.
- You can get new notifications of new offers.

Failure:

- Please connect to the internet.
- Please login to see ongoing offer.
- Not available any offer on this product.

As a user, I want an option to review and report a product so that I can share my experience with others.

Success:

- You can review a product or company whether the product is good or bad.
- You can see the others product review.
- You can comment on others product review.
- You can report a product whether the product is bad.
- You can get reply on your report from seller.

Failure:

- Please connect to the internet.
- Please login to report.
- Please login to give review.
- There is no shipping history in your account of this product so you can't
- Report this product.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Response Time:

- Homepage: Load time within 2 seconds under average traffic conditions.

- Product Pages: Load time within 1 second under average traffic conditions.

- Shopping Cart and Checkout: Completion of transactions within 5 seconds under average traffic conditions.

- API Requests: Response time within 50 milliseconds under average load.

Throughput:

- System capacity: Able to handle 1000 concurrent users under peak traffic conditions.

- Order processing: Ability to process and fulfill 1000 orders per hour during peak periods.

- Search queries: Ability to handle 100 search queries per second.

Availability:

- System uptime of 99.95% over a rolling 12-month period.

- Mean Time to Repair (MTTR) for critical system failures not exceeding 30 minutes.

5.2 Safety Requirements

Data Security:

- Secure Data Storage: All sensitive user data will be stored encrypted at rest and in transit using industry-standard algorithms.

- Access Control: Implementing robust access control mechanisms to restrict unauthorized access to user information and system resources.

- Vulnerability Management: Regular vulnerability scanning and patching to address potential security weaknesses.

- Data Backup and Recovery: Maintaining secure backups of all data to ensure disaster recovery and data integrity.

- Compliance with Data Protection Regulations: Adherence to relevant data protection regulations such as GDPR and CCPA.

User Privacy:

- Transparent Privacy Policy: Clearly informing users about data collection practices, usage, and sharing.

- User Consent: Obtaining explicit consent from users before collecting or processing sensitive personal information.

- Right to Access and Control Data: Providing users with access to their data and the ability to modify, delete, or restrict its processing.

5.3 Security Requirements

Authentication and Authorization:

- Strong user authentication: Utilizing multi-factor authentication (MFA) for all user accounts, including password complexity requirements and regular password resets.

- Role-based access control (RBAC): Defining granular access permissions based on user roles and responsibilities.

- Session management: Implementing secure session management practices with session timeout and inactivity detection.

Data Encryption:

- Encryption at rest and in transit: Encrypting all sensitive data, including user information, financial data, and product details, using industry-standard algorithms like AES-256.

- Secure communication protocols: Utilizing HTTPS for all website communication and secure protocols for data exchange with external APIs.

Vulnerability Management:

- Regular vulnerability scanning and patching: Regularly scanning the system for vulnerabilities and promptly patching any identified weaknesses.

- Penetration testing: Conducting regular penetration testing to identify and address potential security vulnerabilities before malicious actors exploit them.

Network Security:

- Firewalls and intrusion detection/prevention systems (IDS/IPS): Implementing firewalls and IDS/IPS solutions to monitor network traffic for suspicious activity and prevent unauthorized access attempts.

- Secure coding practices: Following secure coding practices to minimize vulnerabilities in the system code.

System Monitoring and Logging:

- Centralized logging: Implementing centralized logging for all system activity and user actions for auditability and security analysis.

- Security incident and event management (SIEM): Utilizing a SIEM solution to detect and respond to security incidents in real-time.

- Regular security audits: Conducting regular security audits to assess the overall security posture of the system and identify areas for improvement.

5.4 Software Quality Attributes

Usability:

- The user interface will be intuitive and easy to navigate for users of all technical backgrounds.

- Clear and consistent design patterns will be used to ensure user expectations are met.

- The system will be responsive and accessible on various devices, including desktops, mobiles, and tablets.

Maintainability:

- The code will be well-structured, modular, and documented to facilitate future maintenance and updates.

- Automated testing tools will be used to ensure code quality and regression prevention.

- The system architecture will be flexible and scalable to accommodate future growth and changing requirements.

Reliability:

- The system will be highly available and resilient to failures.

- Redundant components and failover mechanisms will be implemented to ensure continuous operation.

- Regular monitoring and performance testing will be conducted to identify and address potential issues before they impact users.

Security:

- The system will be designed with robust security measures to protect against unauthorized access, data breaches, and other security threats.

- Industry-standard encryption algorithms will be used to safeguard sensitive data.

- Regular security audits and vulnerability scanning will be performed to identify and address potential weaknesses.

Performance:

- The system will be responsive and able to handle peak traffic loads without significant performance degradation.
- Page load times will be optimized for a fast and smooth user experience.
- The system will be scalable to accommodate future growth and increasing user demands.

5.5 Business Rules

Product Listings:

- All product listings must include accurate and detailed descriptions.
- Product prices must be displayed clearly and transparently.
- Inventory levels must be updated in real-time to reflect available stock.

Orders and Fulfillment:

- Orders must be processed and fulfilled efficiently and accurately.
- Customers must be provided with clear and timely order updates.
- All financial transactions must be secure and compliant with relevant regulations.

Customer Data:

- Customer data must be protected and handled in accordance with privacy laws.
- Customers must have access to their data and the ability to control its use.

Accessibility:

- The system must be accessible to users with disabilities.

Availability:

- The system must be available 24/7 with minimal downtime.

Performance:

- The system must be able to handle peak traffic loads without performance degradation.

6. Other Requirements

Appendix A

Glossary:

- **DAA**—digital asset analysis; a function that involves collection of data about the digital asset (metadata) and, if the asset is a text document, various indexes that identify its contents (full-text, semantic, ontological).
- **DAL**—digital asset loading; a function that facilitates the selection and loading of digital assets.
- **DAR**—digital asset repository; stores digital assets along with their metadex.
- **Metadex**-a combination of metadata and indexes used to identify and search digital assets.
- **Repository**—a central place where data is stored and maintained; it can be either remote or local to the user or system.